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ABSTRACT

This curriculum guide presents methods to disseminate information to students interested in dealing with pests, or who have concerns about the environmental impacts of modern pest control methods. Options are encouraged for pest control methods using a combination of natural, biological, cultural, and chemical means of control. Specifically covered in addition to methods of pest control are the ecology of pests, their effects on man, man's effect on the biosphere, and the determination of what is and what is not a pest. (Author/RE)

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INTEGRATED PEST MANAGEMENT

PRELIMINARY

CURRICULUM GUIDE AND INSTRUCTIONAL MATERIALS FOR A SECONDARY SCHOOL VO-AG PROGRAM

Developed by: Grady County Board of Education
Cairo, Georgia

Project No. 522AH70204

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SE 029 269

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PART II

STUDENTS' WORKBOOK

IPM SCOPE AND SEQUENCE

INTRODUCTION AND TASK DESCRIPTION

In June of 1977 the Grady County Board of Education in Cairo, Georgia received a 1-year grant to develop instructional materials for a high-school-level course in Integrated Pest Management (IPM). The funding for the grant originated in the US Office of Environmental Education (OEE).

The IPM vo-ag instructor worked closely with the Cairo High School Ag Department and local farmers. He found that little emphasis was being placed on the decision-making processes needed for wise pest control and that almost no attention was given to the dangers agricultural chemicals represent. After much research and reading of sample texts, the following books were selected as a basic bibliography for the student curriculum:

*Circle of Life (an introductory text in ecology)

*Silent Spring (still the definitive study of the effects of chemicals on the environment)

*A Source Book on Integrated Pest Management

*Fundamentals of Machine Operation (an outline of chemicals, their uses and precautions)

Because of limited funding and the experimental nature of a beginning curriculum 25 copies of each of the books were obtained. This meant that sufficient class time had to be available for students to read the assigned sections of the books. To give the students materials that they could take home to study, weekly "study sheets" were developed covering the assigned readings; they were placed in a loose-leaf notebook and given to each student.

The scope and sequence detailed in the following pages were then developed. Student notebooks (sample included) were expanded to include reading assignments, study sheets, a glossary, and a list of projects. The projects were included to keep the course from being too academically oriented in the ecological theories necessary as a background for IPM. Also, students were given wide range of choice of practical "hands-on" types of work to allow them to study independently those areas of IPM of most interest to them.

The curriculum which follows has been revised and will undergo futher revisions. A second phase of the curriculum will be written to deal with IPM and livestock production. A third phase will be written to be used by the spring quarter of 1979 to cover pests and IPM scouting practices.

Perhaps the most reliable indication thus far of the success of the basic curriculum is student enrollment for fall quarter, 1978. We had enough interest to offer four classes—two continuation classes in IPM and livestock and two new introductory courses for students wishing to begin to learn about IPM and ways we can protect our environment.

NOTE: The above italicized paragraph was written before discontinuation of the federal grant.

PHILOSOPHY

The philosophy of this curriculum is to disseminate information to those students who have pest problems or who have concerns about our environment concerning the ecological problems of modern day pest control methods. It is further the philosophy of this curriculum to develop information on the options of available pest control using a combination of natural, biological, cultural and chemical means of control. Increasing student knowledge can help to alleviate future problems caused by indiscriminate use of pesticides.

PURPOSE

It is the purpose of this curriculum to develop information of an ecological nature that will aid in the making of intelligent pest management decisions. This curriculum will also show the inter-relationships between man and nature.

GOALS

1. It is the goal of this program to make students aware that pest management problems must be looked at from an ecological point of view if man is going to continue to have a healthy environment in which to live.

2. It is also the goal of this program to teach students that in an IPM approach, chemical pest control is not ruled out but that IPM uses all pest management approaches, focusing on the most effective means of pest control at the least cost to our environment.

COURSE INTRODUCTION

Integrated Pest Management (IPM) involves the use of biological, cultural, natural and chemical controls for pests in a manner that causes the least disruption in a managed ecosystem. The advantage of using four methods than the usual all-chemical approach is:

*economic savings by reducing chemical costs

*environmental savings by reducing chemical residues

*ecological savings by saving beneficial plants, animals and micro-organisms.

Because of limited time, the key concepts of IPM that we will study during this course are the ecology of pests, their effects on man, man's effects on the biosphere, and how to determine what is or is not a pest. By the end of the course, the student will have the background in the philosophy of IPM to pursue its applications to specific areas of pest management in livestock and crop production.

WEEK ONE

	SUBJECT	ACTIVITIES	MOTIVATION	REFERENCES	TIME
MON:	I. Introduction to IPM	Lecture and discussion	Personal experiences in pest control	SourceBook	30 min.
	II. IPM and the Web of Life	Pesto game	Candy		15 min.
		Read Assignments		Circle of Life Silent Spring	15 min.
TUES.		Discuss vocabulary words	Personal involvement		45 min.
		Complete reading assignments and work on study sheets		Circle of Life Silent Spring	15 min.
WED.		The web of life	Film strip		30 min.
		Discuss filmstrip	Personal involvement		10 min.
		Work on projects	Point system	Notebook	20 min.
THUR.		Discuss readings and study sheets	Peer groups	Notebook	30 min.
FRI.		Quiz	Grade		30 min.
		Discuss quiz	Personal involvement		10 min.
		Pesto game	Candy		20 min.
					5 hours

WEEK TWO

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCES	TIME
MON.	III. The Development of Ecosystems	Return quizes			5 min.
		Begin reading	Introductory remarks	Circle of Life Silent Spring	30 min.
		Lecture and discussion on ecosystems	Personal involvement		25 min.
TUES.		Discuss vocabulary words	Personal involvement		30 min.
↓		Complete reading		Circle of Life Silent Spring	30 min.
WED.		Film: "The Development of Ecosystems"	Instructor remarks		40 min.
		Discussion of film	Student interaction		10 min.
		Projects			10 min.
THURS.		Study sheets	Quiz	Notebook	30 min.
		Review for quiz	Grade		30 min.
FRI.		Quiz	Grade		30 min.
		Game: "Stump the Experts"	Peer approval		30 min.
					5 hours

WEEK THREE

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON.	IV. Man in Nature	Return Quizes			5 min.
		Discussion of man's place in nature	Student involvement	Circle of Life Silent Spring	25 min.
		Begin reading assignments and study sheets	Class discussion	Same	30 min.
TUES.		Discuss vocabulary	Student interaction	Notebook	30 min.
		Work on study sheets		Texts	30 min.
WED.		Nature walk around campus	Student involvement	Class discussions	60 min.
THURS.		Class discussion: reading assignments study sheets	Student self-expression	Notebook/ Texts	45 min.
		Review for quiz	Grade	Study sheets	15 min.
FRI.		Quiz	Grade	Teacher-made dittoed test	30 min.
		Discuss quiz	Student improvement		15 min.
		Free reading Projects Teacher conferences	Student freedom of choice	Classroom library Notebooks	15 min.
					5 hours

WEEK FOUR

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON.	V. Man-managed communities	Return quizes	Self-improvement		5 min.
		Lecture on man-managed communities	Relevance of topic	Source Book	20 min.
		Class discussion	Student involvement	Lecture notes	15 min.
		Begin reading assignments	Head start on homework	Source Book/ Class notes	20 min.
TUES.		Discuss vocabulary concepts	Student participation	Notebooks	30 min.
		Study sheets	Quiz grade	Sourcebook/ Notebooks	30 min.
WED.		Filmstrip: "Ecosystems"	Introductory remarks (teacher)		40 min.
		Discussion of film	Student involvement	Notes on film	20 min.
THURS.		Discuss readings and study sheets	Student class participation		30 min.
		Class review for quiz	Grade	Notebooks	20 min.
		Independent study	Grade	Notebooks	10 min.
FRI.		Quiz	Grade	Teacher-made test	30 min.
		Nature walk	Project points		30 min.
					5 hours

WEEK FIVE

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON.	VI. What is a Pest?	Return quizes	Self-improvement		5 min.
		Discuss quizes	Personal involvement		15 min.
		Class discussion: What is a pest?	Student's personal experience	Sourcebook	20 min.
		Study sheets	Class discussion	Notebooks	20 min.
TUES.		Discuss vocabulary	Student interaction	Notebooks	30 min.
		Complete study sheet and reading assignments	Class grade	Sourcebook	30 min.
WED.		Work on projects / Teacher conferences	Project points	Notebook	60 min.
THURS.		Class discussion: Readings and study sheets	Class participation	Notebook/ text	30 min.
		Review for quiz	Grade		20 min.
		Review project point tallies	Grade		10 min.
FRI.		Quiz	Grade	Teacher-made test	30 min.
		Discuss quiz	Self-improvement		10 min.
		Pest puzzle	Points	Teacher-made crossword	20 min.
					5 hours

WEEK SIX

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON.	VII. REVIEW FOR MIDTERM	Review Units I & II Class discussion	Grade/ Student involvement	Circle of Life Silent Spring	45 min.
		Work on projects	Project Points	Notebook	15 min.
TUES.		Review Units III & IV	Grade/ Student involvement	Circle of Life Silent Spring Source Book	45 min.
		Work on projects	Project points	Notebook	15 min.
WED.		Field trip to Coastal Plains Experiment Station, Tifton, Ga.	Practical applications of classroom theory		All day
THURS.		Discuss field trip	Student class participation	Trip notes	30 min.
		Review Unit V	Grade/ Student involvement	Sourcebook	30 min.
FRI.		Mid-term Exam	Grade	Teacher-made test	60 min.
					4 class hrs.

WEEK SEVEN

SUBJECT		ACTIVITY	MOTIVATION	REFERENCES	TIME
MON.	VII. Chemicals and the Environment	Return and discuss midterm exams	Self-improvement		15 min.
		Lecture: "Chemicals and the Environment"	Introductory remarks concerning effects of chemicals on the human body	Silent Spring	30 min.
		Reading assignment	No homework	Silent Spring	15 min.
TUES.		Discuss vocabulary	Student involvement	Notebooks	20 min.
		Study sheets	Preparation for quiz	Notebooks Silent Spring	40 min.
WED.		Movie: "Let's Spray Safely"	Instructor introductory remarks		30 min.
		Discussion of movie	Student self-expression	Movie notes	15 min.
		Complete study sheets	Ability to participate in class discussion	Notebooks Silent Spring	15 min.
THURS.		Review for quiz	Grade	Notes	60 min.
FRI.		Quiz	Grade		30 min.
		Discuss quiz	Self-improvement		15 min.
		Projects	Project points	Notebook	15 min.
					5 hrs.

WEEK EIGHT

	SUBJECT	ACTIVITIES	MOTIVATION	REFERENCES	TIME
MON.	IX. The IPM Philosophy				
		Return quizes			5 min.
		Lecture: The IPM Philosophy	Instructor introduction	Source Book	30 min.
		Begin reading assignments	No homework Teacher available for questions	Source Book	25 min.
TUES.		Discuss vocabulary	Student involvement	Notebooks	30 min.
		Study Sheets	Quiz grade	Source Book Notebooks	30 min.
WED.		Complete study sheets	Quiz grade	Source Book Notebooks	30 min.
		Work on projects/ Conferences	Project points Teacher attention	Notebooks	30 min.
THURS.		Discuss readings and study sheets	Student involvement	Notebooks	30 min.
		Review for quiz	Grade	Notes	15 min.
		Projects	Project points	Notebook	15 min.
FRI.		Quiz	Grade		30 min.
		Nature Walk	Peer interaction		30 min.
					5 hours

WEEK NINE

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON.	X. Plant Pests and Micro-organisms	Return and discuss quizes	Self-improvement		15 min.
		Lecture: Plant Pests and Micro-organisms	Link with student's personal experience with agriculture	FMO Silent Spring	30 min.
		Begin reading assignments	Ability to participate in class	FMO Silent Spring	15 min.
TUES.		Discuss vocabulary	Student involvement	Notebooks	20 min.
		Study sheets	Quiz grade	Notebooks FMO Silent Spring	40 min.
WED.		Film: "Nematode Control"	Instructor remarks		20 min.
		Discuss film	Student involvement	Film notes	20 min.
		Complete study sheets	Quiz grade	FMO Silent Spring	20 min.
THURS.		Discuss readings and study sheets	Student involvement	Notes	30 min.
		Review for quiz	Grade	Notes	15 min.
		Projects	Project points	Notebook	15 min.
FRI.		Quiz Discuss quiz Free Study	Grade Self-improvement Student choice	Class library	30 min. 15 min. 15 min. 5 hours

WEEK TEN

SUBJECT	ACTIVITIES	MOTIVATION	REFERENCE	TIME
MON. XI. Insects and Animal Pests	Return quizes			5 min.
	Lecture and discussion of insect and animal pests	Link with student's personal experiences with agriculture	FMD	30 min.
	Begin reading assignments	No homework	FMD	25 min.
TUES.	Discuss vocabulary	Student involvement	Notebook	20 min.
	Study sheets	Quiz grade	Handout FMD	40 min.
WED.	Field Trip to Hartsfield Farms, Cairo, Ga.	Practical applications of IPM		4 hrs.
THURS.	Discuss reading assignments and study sheets	Student participation	FMD Notebook	30 min.
	Review for quiz	Grade	Notebook	15 min.
	Projects / Teacher conferences	Project points Teacher attention	Notebook Point tallies	15 min.
FRI.	Quiz	Grade		30 min.
	Discuss quiz	Self-improvement		15 min.
	Discuss field trip	Student participation		15 min.
				5 hours

WEEK ELEVEN

	SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON.	XII. IPM and You	Return quizes			5 min.
		Lecture: IPM and you	Topic relevance	Source Book	30 min.
		Reading Assignment	No homework	Source Book	25 min.
TUES.		Discuss vocabulary	Student involvement	Notebook	20 min.
		Study sheets	Quiz grade	Notebook	40 min.
WED.		Complete study sheet	Quiz grade	Notebook Source Book	30 min.
		Work on projects/ Teacher conferences	Project points Teacher attention	Notebook	30 min.
THURS.		Discuss readings and study sheets	Student involvement	Source Book Notebook	30 min.
		Review for quiz	Grade	Notebook	15 min.
		Projects	Project points	Notebook	15 min.
FRI.		Quiz	Grade		30 min.
		Discuss quiz	Self-improvement		15 min.
		Play Pesto	Peer interaction / Candy		15 min.
					5 hours

WEEK TWELVE

SUBJECT	ACTIVITY	MOTIVATION	REFERENCE	TIME
MON. XIII. REVIEW FOR FINAL EXAM	Return quizes	Final grade		5 min.
	Review Units VI & VII	Grade	Silent Spring Source Book	40 min.
	Work on projects	Project points	Notebook	15 min.
TUES.	Review Units VII & IX	Grade	FMD Silent Spring	45 min.
	Work on projects	Project points	Notebook/ Tally sheet	15 min.
WED.	Review Unit X	Grade	Sourcebook	30 min.
	Work on projects/ Teacher conferences	Project points/ Individual attention	Notebook	30 min.
THURS.	Class discussion of IPM principles and their applications	Student participation	Class notes	30 min.
	Projects collected	Project Points	Notebook	30 min.
FRI.	Final Exam	Grade		60 min.
				5 hours

INTEGRATED PEST MANAGEMENT

I

INTRODUCTION

This is an introductory course in Integrated Pest Management (IPM). The purpose of the course is

- to show the interrelationships of nature
- to define "pests"
- to show the damages caused by chemical pesticides to humans and their environment
- to demonstrate the benefits of an integrated approach to pest control.

IPM involves the use of biological, cultural, natural and chemical controls for pests in a manner that causes the least possible disruptions in a man-managed ecosystem. The advantage of using four methods rather than the usual all chemical approach is

- economic savings by reducing chemical costs
- environmental savings by reducing chemical residues
- ecological savings by saving beneficial plants, animals and micro-organisms.

Because of limited time, the key concepts of IPM that we will study during this course are the ecology of pests, their effects on man, man's effect on the biosphere, and how to determine what is or is not a pest. By the end of the course, you will have the necessary background in the philosophy of IPM to pursue its applications to specific areas of pest management in livestock and crop production.

CLASS RULES

1. Have pencil sharpened and be in your seat when the second bell rings.
2. Have your restroom needs taken care of before class.
3. Bring pencil and paper to class every day.
4. No gum, eats or drinks are allowed in the classroom.
5. Raise hand for recognition before speaking.
6. No two persons may talk at the same time.
7. All students must participate in classroom games.
8. All students present must hand in a test paper.
9. On most days the last 10-15 minutes will be spent in reading. You must study IPM.
10. No one leaves his or her seat until dismissed by the teacher.

GRADING

25% quiz grade
25% midterm grade
25% project grade
25% final exam grade

Students are responsible for doing weekly reading assignments and study sheets. A weekly quiz will be given over the material covered. If you are absent, it is your responsibility to find out and make up any material that you missed.

Projects may be turned in as completed. The student may keep a point tally in his notebook, but the official record will be the instructor's. No projects will be returned until the end of the quarter. Deadline for project submission will be one week before the last day of class. At least 30 project points must be earned by midterm to receive an S on the midterm report.

WEEKLY SCHEDULE

Monday—Vocabulary

Tuesday—In-class reading and study sheets

Wednesday—Discuss study sheets and reading material

Thursday—Projects

Friday—Review, quiz, games, films, field trips

INTEGRATED PEST MANAGEMENT I

A Scope and Sequence

I. FRICTION IN THE BIOSPHERE

Unit 1 — IPM and the Web of Life

Unit 2 — The Development of Ecosystems

Unit 3 — Man in Nature

II. MAN'S OPTIONS AND THEIR EFFECTS

Unit 4 — Man-Managed Ecosystems

Unit 5 — What is a Pest?

Unit 6 — Chemicals and the Environment

III. IPM: THE STRATEGY OF THE FUTURE

Unit 7 — The IPM Philosophy

Unit 8 — Plant Pests and Micro-organisms

Unit 9 — Insect and Animal Pests

Unit 10 - IPM at Home

UNIT I — IPM AND THE WEB OF LIFE

A. Reading Assignment

Ecology: Circle of Life — pages 7-43

Silent Spring — pages 1-3

B. Vocabulary

1. energy
2. food chain
3. food web
4. producer
5. chlorophyll
6. consumer
7. predator
8. parasite
9. scavenger
10. decomposer
11. commensalism
12. mutualism
13. lichen
14. competition
15. community

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary terms with at least 70% accuracy.

2. List examples of the following:

   a. a predator and its prey
   b. a parasite and its host
   c. scavenger
   d. decomposer
   e. commensalism
   f. mutualism

3. Sketch a food web that could be found in Grady County.

4. Explain the statement "All living things affect one another either directly or indirectly."

Study Sheet # 1

Read Ecology: Circle of Life, pages 7-43.

1. List the parts of the Great Plains food chain.

   1. _____ _____

   2. _____

   3. _____

   4. _____

2. Life for all living members of the environment is little more than a continuous struggle for _____.

3. The survival of an individual depends on his ability to obtain _____.

4. All _____ _____ affect each other either directly or indirectly.

5. Green plants that make their own food are called _____, or autotrophs.

6. _____ is the substance responsible for food production.

7. _____ depend directly or indirectly on food-producing plants.

8. A _____ is an animal or plant that kills others before or during the process of eating them. Some examples are _____

   _____

9. A _____ gets its energy from another organism without killing it. Some examples are:

   _____

10. An organism that obtains energy by feeding only on animals that have becom very weak or have died is called a _____. An example in Grady County is a _____.

11. _____ chemically break down the waste and dead bodies of plants and animals for food energy. An example is _____

    _____.

12. _____ refers to the relationship between plant and/or animals in which one member of the pair benefits and the other is neither benefited or harmed. An example is _____

13. _____ is a relationship between plants and/or animals in which both organisms benefit in some way. An example is

    _____.

14. A _____ is really a combination of a fungus plant and algae living and growing together.

15. Living things must _____ with each other for the conditions necessary for them to survive.

16. A _____ is a whole set of different plants and animals living together in a particular kind of setting. The plants and animals must have each other in order to survive over time.

17. _____ are usually, but not always, the major living things in a community.

18. The flow of energy from one organism to another is called a _____ _____.

19. A more realistic and complex description of the way energy moves in a community is called a _____ _____.

20. A (large, small) part of energy actually gets to the top level of a food chain.

J E N I C I D E M D E C O M P O S E R S G
L M A I T S E P K L T O M O T H L C R T C
P S U J C O M M U N I T Y P S T A O D U O
R C E T B T L I F E S F G Q E B D L E V M
S H E K U U D I H P A L U E T C Y O T W M
Q L B L V A Z F J M R Y B R U D H G A N E
T O S T Y W L G S C A V E N G E R Y R O N
E R C N E H C I L N P R E D A T O R G I S
C O N S U M E R S W E B E I N G I Q E L A
R P D M X A E H I M E C O M O M I C T L L
U H A N I M A L U L U N K P Y H J O N I I
O Y E N E I C S C I E N C E G E U W I M S
S L F O Y B N D R E C U D O R P K M X Y M
E L G P F O O D C H A I N A E F L P A B F
R R H Q C O M P E T I T I O N G M O Z N E
Z P L A N T C M A N A G E M E N T N A C D

THIS PUZZLE INCLUDES YOUR VOCABULARY WORDS FROM UNIT ONE PLUS THE WORDS BELOW:

SCIENCE	INTEGRATED	PEST	MANAGEMENT
ECOLOGY	MEDICINE	HUMAN	BEING
ANIMAL	PLANT	BEETLE	BUG
LIFE	MILLION	ECONOMIC	COW
APHID	LADY	BUG	BEE
MOTH	FLY	RESOURCE	

UNIT 2 — THE DEVELOPMENT OF ECOSYSTEMS

A. Reading Assignment

Ecology: Circle of Life — pages 43-63

Silent Spring — pages 53-56

B. Vocabulary

1. species
2. canopy
3. understory
4. shrub layer
5. herb layer
6. litter-soil layer
7. decomposition
8. climax community
9. succession
10. algae
11. bacteria
12. fungi
13. springtails
14. putrification
15. aeration

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary words with at least 70% accuracy.
2. List the components of a hardwood forest and give examples of each layer
3. Describe a climax community.
4. Describe lake or pond succession.
5. List the steps of succession from bare rock to forest.
6. List the three principal elements of decay — bacteria, fungi, and algae
7. Describe the actions of the earthworm essential to the soil.

STUDY SHEET # 2

1. List the component parts of the hardwood forest from highest to lowest.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

2. Give an example of each layer in question 1.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

3. Each layer in the forest tends to have a _____ structure of its own.

4. List the layer of the hardwood forest that the following organisms would be most likely to inhabit.

   a. ladybird beetle _____

   b. bee _____

   c. oriole _____

   d. spider _____

   e. earthworm _____

5. A stable community that remains relatively unchanged for centuries is called a _____ community.

6. When you see water lilies on a lake, it is a sign the lake is _____.

7. The gradual process of change in a community is called _____.

8. The earth would be covered with climax communities if _____ did not occur.

9. List the steps of succession from bare rock to forest from beginning to end.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

   f. _____

10. Much of North America is covered with _____ _____.

UNSCRAMBLE THE WORDS LISTED BELOW.

1. SIPEESC _____
2. GALEA _____
3. MYTCMNIUO _____
4. TRLITE _____
5. LSID _____
6. RSDRETONU _____
7. HREB _____
8. XILMAC _____
9. NSSUCECSOI _____
10. YRLEA _____
11. BRUHS _____
12. LCHLLYOHRPO _____
13. NECHIL _____
14. REDPOMSECO _____
15. SRAPTEAI _____

UNIT 3 — MAN IN NATURE

A. Reading Assignment

Ecology: Circle of Life pages 64-92

Silent Spring pages 5-13

B. Vocabulary

1. technology
2. culture
3. terrestrial
4. domestication
5. industrialization
6. pesticide
7. beneficial
8. residue
9. extinction
10. aesthetic
11. paradox
12. ethic
13. conservation
14. check and balance
15. avarice

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary terms with at least 70% accuracy.
2. Describe man as a member of an ecosystem rather than its master.
3. List the components of man's culture—clothes, shelter, domestic animals, transportation, tools, and language.
4. Define man as a producer of communities.
5. Explain problems caused by one-crop agriculture.
6. List several common pesticides.
7. Explain some of the ecological problems man's expanding numbers have created, including stress, pollution, reduced oxygen, and chemical residue.
8. List the three options of population control—immigration, death control, and birth control.
9. Describe the importance of an individual set of ecological values (an ethic).

Study Sheet # 3

1. The _____ and _____ that keep communities vigorous developed as early as life itself.

2. All of these—clothes, shelter, domestic animals, transportation, tools and language are a part of what we call _____.

3. Man is said to have a mutualistic relationship with most of his _____ plants and animals.

4. When a prey population grows so does the _____ population.

5. Name three ways in which man has changed natural communities.
   A. _____.
   B. _____.
   C. _____.

6. As we have seen man acts in two different directions at once—one direction apart from nature and the other completely tied to nature. This situation is known as the _____ of man.

7. When human beings behave in a way that fits into the natural scheme of nature they are practicing _____.

8. An _____ _____ puts man in a rational or logical relationship with the environment.

9. We are trapped on this planet and completely dependent on the energy produced by the green plants of the earth for food. We are also dependent on them for our _____.

10. Name two ways in which insects come in conflict with our human welfare.
    A. _____
    B. _____

11. Write one paragraph on the dangers of pesticides as outlined in SILENT SPRIN

12. List the three options of population control.
    A. _____
    B. _____
    C. _____

13. List three pesticides talked about in the CIRCLE OF LIFE.
    A. _____
    B. _____
    C. _____

UNIT 3

D E C B H T E T H I C Z T A E I D
P E S T E E D F U N G I Q R S T O
L C O N R R E S I D U E M E M T M
I C N O B R C B A U T Z M A L Z E
T H B E L E A A E S T H E T I C S
T E S N A S C U L T U R E I C O T
E C C W Y T V B F R P D X O H N I
R K A N E R X Y O I E Z T N E S C
S A V A R I C E O A S L I G N E A
O N E C B A C B D L T E N O C R T
I D W Q R L O S C I I T C U Z V I
L B G A C D N O H Z C P T Q R A O
L A E S T U S V A A I W I X Y T N
A L G A E A U B I T O C O D F I Z
Y A G J L N M P N I E H N I K O E
E N E R G Y E P R O D U C E R N M
R C R T V O R B E N I F I C I A L
T E C H N O L O G Y Q S U W Z Y X

THIS PUZZLE INCLUDES YOUR VOCABULARY WORDS FROM UNIT 3 PLUS THE WORDS BELOW.

ALGAE	ENERGY	SCAVENGE
LITTER SOIL LAYER	LICHENS	HERB LAYER
FUNGI	PRODUCER	REST
AERATION	CONSUMER	

UNIT 4 — MAN-MANAGED COMMUNITIES

A. Read: Sourcebook—Chapter 2, pages 12-45

B. Vocabulary

1. IPM
2. biosphere
3. ecosystem
4. silviculture
5. organism
6. invertebrate
7. vertebrate
8. eradication
9. community
10. predator
11. finite
12. infinite
13. trophic
14. autotroph
15. heterotroph
16. herbivore
17. carnivore
18. biotic
19. abiotic
20. photosynthesis

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary terms with at least 70% accuracy .
2. List the levels of biological activity in order.
3. List the two forces that unify the biosphere.
4. List six elements essential for life.
5. List conditions necessary for photosynthesis to occur.
6. Arrange components of a food chain in chronological order.
7. Define characteristic abundances and list mechanisms for its control.
8. List six "limited factors" of the survival of a species.
9. List three reasons for the instability of man-managed ecosystems.

STUDY SHEET # 4

Read Sourcebook, Chapter 2

1. List the levels of biological activity from largest (a) to smallest (b).

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

2. What are the two forces that unify the biosphere?

   a. the _____ of _____.

   b. the _____ and _____ of _____.

3. Approximately _____ essential elements are required for normal growth and body maintenance. Name ten.

   a. _____ f. _____

   b. _____ g. _____

   c. _____ h. _____

   d. _____ i. _____

   e. _____ j. _____

   Are these elements finite or infinite? _____

4. A bisic integrating factor in the universe is the flow of _____, a _____ way transfer of energy through one organism to another. The source of energy is _____.

5. Every living organism requires _____ for the metabolic processes of energy storage and release.

6. From the sun, energy is used first by _____ in photosynthesis and then by other organisms _____ hand.

7. The energy flow from the sun is trapped in

   a. _____ reservoirs

   b. _____ reservoirs

8. Conditions necessary for photosynthesis include:

   a. _____'s energy

   b. _____

   c. _____ _____

   d. _____

9. Plants take in _____ _____ and breath out _____; animals take in _____ and release _____ _____.

10. A series of organisms feeding on each other is called a _____ _____.

11. The first part of a food chain is the _____ or self-feeder. Next is the _____, the first heterotroph. Carnivores come next in most food chains. The last heterotroph is the _____ or reducer organism, the "_____ of the biosphere."

12. Food chains describe the direction of _____ flow.

13. When a food chain becomes more complex, it is called a food _____.

14. Toxic substances are likely to concentrate at the (highest, lowest) level on the food chain.

15. List the order of evolution of bare rock into a forest ecosystem.

   1. _____

   2. _____

   3. _____

   4. _____

   5. _____

   6. _____

16. Factors that keep the population of a natural ecosystem at a constant level are:

   a. _____

   b. _____

17. Name several "limiting factors" that limit the number of individuals of a species able to survive in a prescribed area:

a. _____ d. _____

b. _____ e. _____

c. _____ f. _____

18. A human-managed ecosystem is (more, less) stable than a natural ecosystem.

19. Some reasons for the instability of managed ecosystems are:

a. _____ diversity

b. _____ diversity

c. lack of _____ in plant growth forms

d. _____ spacing of plants

20. Agro-ecosystems are of a (tempory, permanent) nature.

Z P R Q A Z I N C W O X O G T
N E G R O D Y H A L I V E M S
P N R A I N T C E S N I T O E
H I O F C O B A L T E F I L L
O D W L R U F L U S P R A Y E
S I M U B U G C W N K R T B N
P O U O N O R I A E C E O D I
H H I R I X A U I R A P M E U
O I S I T Y T M T V B P S N M
R V S N R G R A T E I O U U U
U E A E O E A C O A D C N M I
S N T R G N G C I I Z D N R M
F O O D E T U R U R U O Y F O
T B P I N U S M O O N O P D R
A R E T A W E N I R O L H C H
M U I S E N G A M P G B I G C

FIND THE WORDS IN THE ELEMENTS ON PAGES 17 AND 18 PLUS:

AIR	HIVE	WATER	INSECT	SUN
ALIVE	FOOD	SPRAY	GROW	ATOM
RAIN	MAT	NERVE	PIN	LIFE
BUG	BLOOD	RAT	MOON	WAIT
SUGAR	BACK	BONE	BIG	SUNNY
RATE				

CROSSWORD PUZZLE CLUES

ACROSS

1. Chemical used to kill insects is an _____.
2. A predator is the lady bird _____.
4. Another predator
5. _____ _____ level indicates pest densities at which control levels are economically justified.
7. _____ treatments are applied to limited areas such as in Canadian thistle patches.
8. A pest that eats a human resource is a _____ _____
11. Pests that are a problem year after year are _____.
13. The release of sterile males is an example of _____ control.
15. A frequent urban pest
16. A chemical used on internal parasites in animals
18. Organisms successfully feeding on each other are called a _____ _____.
19. Interdependent populations of plants, animals and micro-organisms who share a common environment are a _____.
22. Blood sucking arthropods usually found on dogs
24. Corn ear worms scientific name is Heliothis _____.
25. A herbicide containing ammonia and sulfur
29. Oxygen is an _____ element to life.
30. Rats are in the _____family.
32. Device for catching something
34. Herbicides, insecticides as a group are called _____.
35. Some pesticides can cause _____.
36. If swallowed, breathed or absorbed in the skin, pesticides can be _____
37. Dichlor-diphenyl-trichloroethane (initials)

38. Parts per million (abbreviation)

40. _____ are a natural enemy of rats.

41. When chemicals are used repeatedly a _____ can build up.

DOWN

1. Management system using two or more forms of pest control

2. Bed_____

3. A community and its non-living support system

4. Chemical used in war against fire ants

9. A treatment given to counteract the effect of a poison

10. One of the first chemicals used as a pesticide

12. Plural form of 34 acres

13. Copper-based chemical used in 19th century against mildew in French grapes

14. Without this element all animals would die

17. Trace element (metallic) used in formulating pesticides

20. Poison used as a pesticide and insecticide

23. Robert _____den Bosch

26. Pest which comes in occasionally from a different area to inflict damage on a crop is a _____pest.

27. Six-legged organism

28. A decomposer of wood

31. Paris _____

33. The lacewing is a _____

34. Any organism which causes economic loss or human discomfort

39. An eight-legged organism

UNIT V—WHAT IS A PEST?

A. Reading Assignment

Sourcebook—pages 1-10
Sourcebook—pages 47-78

B. Vocabulary

1. pest
2. pathogen
3. mircoorganism
4. arthropod
5. entomologist
6. toxic
7. resistant strains
8. natural enemy
9. beneficial
10. entomophobia
11. population density
12. characteristic abundance
13. environmental manipulation
14. economic threshold
15. key pest

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary terms with at least 70% accuracy.

2. List the varieties of pests—insect, invertebrate, vertebrate, microorganisms, weeds—and given an example of each.

3. List the available methods of pest control—chemical, biological, cultural, and natural.

4. Distinguish between economic, aesthetic and discomfort injury levels.

5. Explain the statement "Economic loss is primarily a function of population density."

6. List the two kinds of pests in relation to human-valued resources—competitors and consumers.

7. List the kinds of pests—key pests, occasional pests, potential pests, migrant pests and non-pests.

8. Explain ways of combating entomophobia.

STUDY SHEET # 5

1. The definition of "pest" is totally _____ oriented.

2. Organisms designated as pest compete with people for _____, _____, and _____, or transmit pathogens, feed on people or otherwise threaten human health, comfort or welfare.

3. Name three invertebrates, three vertebrates, three microorganisms and three weeds which have become pests.

Invertebrates	Vertebrates	Micro-Organisms	Weeds
A. _____	A. _____	A. _____	A. _____
B. _____	B. _____	B. _____	B. _____
C. _____	C. _____	C. _____	C. _____

4. The first methods of pest control were the _____, _____, and _____ of insects.

5. The first hint of modern insecticide fallibility was the development of _____ in insects exposed to _____ materials.

6. It is of critical importance to remember that _____ _____ is basically an _____ problem.

7. A _____ is an organism which reduces the availability of some human-valued resource.

8. Organisms which become pests can be placed on two levels along the food chain in relation to a human valued resource.
Name the two levels.
A. _____
B. _____

9. _____ is the fear of insects.

10. The heart and soul of an integrated pest management approach asks three questions. What are these three questions.
A. _____?
B. _____?
C. _____?

11. _____ _____ tells resource producers when they must take action to prevent an impending pest outbreak.

12. Organisms which cause a significant reduction in yield every season unless some pest management action is taken are known as _____.

13. Organisms whose populations flare up to cause significant damage once in a while but generally do not cause intolerable loss are known as _____ _____.

14. _____ _____ are organisms which never cause serious damage unless management procedures are changed in such a way as to promote a population increase.

STUDY SHEET # 5

15. Locusts, armyworms, and birds are examples of _____ _____

16. _____ _____ under any situation can never cause damage to a resource.

17. The parasitic wasp is a _____ _____ of the grape leaf hopper.

18. We have increased our pest problems over the last forty years by merely demanding _____ appealing produce.

19. There are three major pest control methods in an integrated pest management approach. What are they?
    A. _____
    B. _____
    C. _____

20. The fourth pest control method is _____ _____. In this method no action is taken.

21. Write one paragraph explaining how entomophobia could be solved.

UNIT VI—CHEMICALS AND THE ENVIRONMENT

A. Reading Assignment

Silent Spring—pages 24-43

B. Vocabulary

1. elixir
2. synthetic
3. residue
4. contamination
5. carcinogenic
6. sterility
7. enzyme
8. acute
9. potentiation
10. metabolism
11. mutation
12. insecticide
13. herbicide
14. defoliant
15. systemic

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary terms with at least 70% accuracy.

2. List the four major categories of chemical pesticides—arsenicals, cholorinated hydrocarbons, organic phosphates and systemics.

3. List several of the most commonly used pesticides in Grady County.

4. Distinguish between a pesticide, a herbicide, and an insecticide.

5. List some effects of chemicals on the human body.

UNIT VII—THE IPM PHILOSOPHY

A. Reading Assignments

Sourcebook-pages 170-192

B. Vocabulary

1. diversify
2. pest resurgence
3. secondary pest outbreak
4. disruption
5. potential
6. compatible
7. life cycle
8. stress
9. limiting factor
10. monitoring
11. vulnerable
12. prevalent
13. mortality
14. option
15. suppress

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary terms with at least 70% accuracy.
2. Briefly state the IPM philosophy.
3. Give examples of chemical, natural and biological controls.
4. Describe IPM monitoring procedures.
5. List information an IPM specialist needs before deciding what action to take against a pest.
6. List several careers available in IPM and describe the training each requires.

UNIT VIII—PLANT PESTS AND MICRO-ORGANISMS

A. Reading Assignments

FMO—pages 34-70
Silent Spring—pages 63-85

B. Vocabulary

1. plant pest
2. dormancy
3. annual
4. biennial
5. perennial
6. herbicide
7. defoliant
8. spores
9. blight
10. nematode
11. fumigation
12. sanitation
13. fungicide
14. nematicide
15. pathogen free
16. crop rotation
17. vectors
18. phytotoxic

C. Student Objectives

When you finish this unit you will be able to:

1. Define vocabulary terms with at least 70% accuracy.
2. Give examples showing that any plant can be a pest in a given situation.
3. Describe the economic loss and human discomfort caused by plant pest.
4. Give examples of biological, cultural and chemical control in plant pests and disease pathogens.
5. Name the three groups of biological pathogens as: fungi, bacteria, and virsuses.
6. Give at least three ways by which plant pests and biological pathogens can be spread.

STUDY SHEET # 8

WEEDS

1. _____ _____ are unwanted plants in a given area.

2. Plant pest compete with crops for _____, _____ and _____.

3. Weeds or plant pests cause economic loss in three ways:
   A. _____
   B. _____
   C. _____

4. Plant pests can cause human discomfort. Cite two examples of weeds being irritating to human conditions.
   A. _____.
   B. _____.

5. Name one plant common in Georgia that if eaten by animals can cause death. _____

6. Give one example of each of the following types of plants: annual, biennial and perennial.
   A. _____
   B. _____
   C. _____

7. There are three methods of weed control: biological, cultural and chemical. Give one example of each.
   A. Biological - _____.
   B. Cultural - _____.
   C. Chemical - _____.

8. Name four ways that seeds are spread.
   A. _____.
   B. _____.
   C. _____.
   D. _____.

9. Give two modes of action of a herbicide.
   A. _____
   B. _____

10. Give two application patterns
   A. _____
   B. _____

STUDY SHEET # 8

MICRO-ORGANISMS

11. Name the three groups of biological pathogens.
    A. _____
    B. _____
    C. _____

12. Name four ways that pathogens can be spread.
    A. _____ C. _____
    B. _____ D. _____

13. Most fungi reproduce by means of microscopic _____.

14. _____ are tiny eel-like animals.

15. A _____ is used to control fungi and bacteria in living and non-living plants and animals.

16. Name three groups of fungicides.
    A. _____
    B. _____
    C. _____

17. Write one paragraph on the benefits of crop rotation in a field known to have disease pathogens.

UNIT IX--INSECT AND ANIMAL PESTS

A. Reading Assignments

FMO--pages 74-92

B. Vocabulary

1. chewing insects
2. sucking insects
3. metamorphosis
4. population density
5. monitoring
6. DDT
7. organophosphates
8. chlorinated hydrocarbons
9. carbamates
10. synergism
11. phytotoxic
12. LD_{50}
13. inorganics
14. organics
15. synthetic organics
16. resistant insects

C. Student Objectives

When you finish this unit, you will be able to:

1. Define vocabulary words with at least 70% accuracy.
2. Name the four major groups of insects and cite the damage they cause.
3. Define the four insect control methods (natural, biological, cultural, chemical) and give examples of each.
4. Name the three groups of insecticides (organophosphates, chlorinated hydrocarbons, carbamates).
5. Define LD_{50} and its numerical scale.
6. Name four examples of vertebrate animal pests and give examples of the damage they can cause.
7. Develop an integrated approach to the management of an insect pest and a vertebrate animal pest.

UNIT IX STUDY SHEET

1. Name the four group classifications that most insects are in:

   a. _____

   b. _____

   c. _____

   d. _____

2. Insects that cause crop damage are of two basic types. Name the two types and give an example of the damage each type causes.

   a. _____

   b. _____

3. The changes that take place in an insect's growth are known as its

   _____.

4. Give two of the four factors that lead to an insect outbreak.

   a. _____

   b. _____

5. Give one example of each of the following insect control methods.

   a. Natural _____

   b. Biological _____

   c. Cultural _____

   d. Chemical _____

6. Name the three major groups of insecticides.

   a. _____

   b. _____

   c. _____

7. Give an example of a chemical in each of the followiag three groups of insectici

   a. Inorganics_____

   b. Organics_____

   c. Synthetic organics_____

8. There are three groups of synthetic organic insecticides. Give a chemical example of each of the follcwing three groups.

   a. chlorinated hydrocarbons_____

   b. organophosphates_____

   c. carbamates_____

9. If the toxicity of a combination of chemicals is greater than the sum of the two chemicals used separately it is said to have _____ action.

10. LD_{50} refers to the _____of a chemical.

11. Name the three ways of exposure to insecticides.

   a. _____

   b. _____

   c. _____

12. Give an example of an insect pest and give an integrated approach to the control of this insect. Include in the example the economic loss caused if no control methods are used. (Use the back of this study sheet.)

13. Give an example of a vertebrate animal which is or can become a pest.

   _____

14. Give an example of each of the following control methods used to control animal pests.

   a. biological_____

   b. cultural _____

   c. chemical_____

15. Give an example of an animal pest and describe an integrated approach that could control this animal. (Use the back of this page.)

UNIT X--IPM AT HOME

A. Reading Assignments

Sourcebook-pages 346-357, 375-391

B. Vocabulary

1. larva
2. pupa
3. source reduction
4. larvacide
5. potholes
6. gambusia fish
7. monitoring
8. aesthetic injury
9. aphids
10. honeydew
11. lady bird beetle
12. lacewing
13. microbial insecticide
14. pruning

C. Student Objectives

When you finish this unit you will be able to:

1. Define vocabulary terms with at least 70% accuracy.
2. Give one example of the three control methods for mosquito control and one of urban street tree pest control.
3. List the educational requirements for two IPM related jobs.
4. List three ways that you can use IPM techniques in your home.
5. Describe the conflict between the EPA and chemical interests.
6. Describe the conflict between some environmentalists and the IPM philosophy.
7. Tell how IPM is a compromise between environmentalists and chemical interests.

PROJECT GUIDE

The project points earn 1/4 of your final grade in this course. The point/grade schedule is:

A=100 points
B= 90 points
C= 80 points
D= 70 points
F= 69 or less points

Bonus points will be given for exceptional projects. All projects must be written in ink or typed on one side only of smooth edged paper. A cover sheet must be attached with the following information:

Name
Class Period
Date
Project Number

Projects not following this format will be returned to you.

POINTS	Project

25 (limit 2) 1. Read one of the following books. Write a book report on it. Books may be checked out from the teacher or the library. Bonus points may be earned by giving an oral book report after the written report has been approved.

1. Who Cares? I Do --Munro Leaf
2. Eco-Catastrophe--The Editors of Ramparts
3. Field Book of Insects--Frank E. Lutz, Ph.D.
4. The Environment--the Editors of Fortune
5. Design with Nature--Ian L. McHarg
6. Before Nature Dies--Jean Dorst
7. Silent Spring--Rachel Carson
8. The Environmet Handbook--edited by Garrett De Bell
9. Ecotage--edited by Sam Love and David Obst
10. The True Book of Insects--Illa Pondendorf
11. Since Silent Spring--Frank Graham, Jr.
12. Voices for the Wilderness --edited by William Schwartz
13. Insects Are Where You Find Them--Helen Damrosch Tee-Van
14. Natural Partnerships--Dorothy Shuttlesworth
15. The Changing World of Living Things--Frances L. Behnke
16. The Gardener's Bug Book--Cynthia Westcott
17. A Place in the Sun--Lois and Louis Darling
18. Ecology, The Circle of Life--Harold R. Hungerford, Ph.D.
19. The Quiet Crisis--Stewart L. Udall
20. Our Poisoned Planet--U. S. News and World Report
21. A Walk Through the Marsh--C. William Harrison
22. The Environment--Irvin Adler

You may also use any other book approved by the teacher.

POINTS

10 (limit 2) 2. Magazines

1. Farm Journal of August 1975, page 30
2. Farm Journal of September 1975
3. Farm Journal of April 1977, page E-1
4. Farm Journal of June/July 1977; page 7 page 17
5. Farm Journal of February 1973; page 12
6. Farm Journal of April 1974; page 8
7. Farm Journal of May 1974; page 29

(Or any other article approved by the teacher.)

5 (limit 5) 3. Bring in a specimen of a pest. You may use insect or weed pests. Specimens must be:

a. dead
b. Affixed to paper or in a small jar
c. clean
d. labelled

You may bring only one of any one kind. You may also sketch any pest that you wish for points.

10 (limit 2) 4. Make a crossword puzzle using words related to IPM. Include:

a. blank puzzle spaces
b. clue sheet
c. answer key

Your puzzle must include at least 25 words.

1 each 5. Find out what the following abbreviations stand for. Write answer in project form.

a.	ASCS	d.	PCA	g.	FFA	j.	VICA
b.	HEW	e.	DDT,	h.	FHA	k.	ES
c.	EPA	f.	USDA	i.	APHIS	l.	CES

5 each (limit 4) 6. Write a report on one of the following topics. Tell what source you used to find your information.

a. crop rotation
b. pests common to Grady County
c. crops common in Grady County
d. IPM career possibilities in Grady County
e. career possibilities in IPM outside Grady County
f. pesticide residuals
g. pesticide drift
h. economic threshold
i. a food chain and pesticides
j. pest control in the 1800's
k. pesticide regulatory agencies
l. sanitary procedures
m. other topics approved by teacher

POINTS

5 each (limit 4) 7. Draw and label a sketch of a pest. Include any information about its life cycle that you can.

a. bristletail
b. lice
c. thrip
d. termite
e. grasshopper
f. aphid
g. nematodes
h. moth and caterpillars
i. beetle and weevils
j. fly (any variety)
k. mosquito
l. bees
m. wasps
n. ants
o. mite
p. spider
q. snail
r. slug
s. sawfly
t. fish
u. turtle
v. snake
w. birds
x. rabbit
y. tick

5 each (limit 4) 8. Find newspaper or magazine articles on topics related to IPM. Mount on paper and follow project cover sheet guidelines. List the date and source of the article.

5 each (limit 4) 9. Draw and label a sketch of a plant pest. Include any information that you can.

a. crabgrass
b. foxtail
c. dandelion
d. cudzu
e. bermuda grass
f. coffeeweed
g. cocklebur
h. chickweed
i. jimsonweed
j. nettle
k. lambsquarters
l. morning glory
m. mustard
n. nightshade
o. ragweed
p. other

5 each (limit 4) 10. a. List the ingredients on a label of a pesticide.
b. Define what each ingredient is used for.
c. Describe formulation.
d. List precautions.
e. Circle active ingredients.

5 each (limit 4) 11. List all magazines relating to ecology or agriculture or any other aspect of IPM available at high school library or at Roddenbery Memorial Library. Include:

a. exact title (underlined)
b. publisher
c. frequency of issue
d. sample table of contents from a recent issue
e. list 5 advertisers and their products related to IPM

POINTS

5 each (limit 4) 12. Write a one-page report on any pesticide. Tell:

a. use
b. precautions
c. formulations
d. residual effects
e. any other pertinent information

Some examples are Mirex, DDT Harvest Aid chemicals.

10 (limit 2) 13. Interview a Grady County farmer. Include the following information in your report:

a. crops he grows
b. crops he rotates and why
c. pesticides he uses
   1. how?
   2. why?
   3. when?
   4. where?
   5. negative reactions?

10 (limit 2) 14. Interview a local pesticide applicator (examples: Orkin, Eidson, Hatcher or a crop duster) Find out:

a. pests he treats
b. most common locations of pests
c. pesticides he uses
d. equipment he uses
e. precautions he takes
f. frequency of application
g. any other pertinent information

10 (limit 2) 15. Interview a member of the agricultural extension service in Grady or a neighboring county, or from ABAC. Find out:

a. crops that are scouted locally
b. how scouts are selected
c. training required
d. pay, working hours, fringe benefits
e. uses for any data obtained by scout

10 16. Field trip reports. Write a report on what you learned. Include:

a. site visited
b. date
c. purpose of trip
d. guide's name and title
e. any other pertinent
f. evaluation--was the trip worthwhile?

POINTS

5 (limit 2)

17. Draw and label a sprayer or any other piece of IPM equipment. Tell what the equipment is used for.

5 (limit 3)

18. Bring in a specimen of a plant damaged by a pest.

a. mount plant
b. label plant
c. source of plant
d. identify pest
e. tell what method could have been used to prevent damage

Do not bring more than one of the same variety of plant.

5 (limit 3)

19. Sketch or bring in a diseased plant. Include:

a. name of plant
b. source of plant
c. type of disease
d. possible method of control or prevention of disease

20 (limit 1)

20. Describe a specific pest problem in Grady County. Develop an IPM strategy to combat this pest. Controls described should not be limited to chemical methods, but should include biological, cultural and natural methods as well.

GLOSSARY

Definitions which follow apply specifically to subject matter in this book.

A

ABIOTIC—Not living

ABSORPTION—Process of being "sucked up" or taken into: specifically, entry of a chemical into an organism such as a plant or insect.

ACARICIDE—Pesticide used to control mites and ticks.

ACTIVE INGREDIENT—That part of a pesticide formulation directly responsible for the pesticidal effect.

ACUTE—Severe and sudden.

ADJUVANT—Material added to a pesticide to improve the action of the active ingredient.

AERATION—Exposure to air.

AESTHETIC—Perceptible to the senses as beautiful or pleasing.

ALGAE—Photosynthetic plant commonly called seaweed.

ANNUAL—A plant that grows, matures and produces seed in a single year and then dies.

ANTIDOTE—A treatment given to counteract the effects of a poison.

ARTHROPOD—Invertebrate phylum of animals that includes insects and spiders.

ATTRACTANT—Substance used to attract pests.

AUTOTROPH OR PRODUCER—Self-feeder-organism capable of photosynthesis-green plant with chlorophyll-traps light energy when carbon dioxide and water are combined to form sugars and starch. Can vary from microscopic algae to giant trees.

AVARICE—greed

B

BACTERIA—Autotrophic microorganism that aids in nitrification, putrefaction and fermentation. Can be pathogenic or beneficial.

BAIT—Food or other material used to attract a pest to a trap or pesticide.

BAND APPLICATION—Application made in a narrow band, usually over or alongside a row.

BASAL APPLICATION—Application of a herbicide to the lower portion of the stems of woody plants.

BENEFICIAL—Helpful, profitable, advantageous.

BIENNIAL—Plant that matures and produces seed during the second year of its life and dies after not more than two years of life.

BIOCIDE—Poison which kills all living things.

BIOLOGICAL CONTROL—Use of biological agents, such as parasites and predators, to control pests.

BIOSPHERE—Largest biological unit including living beings together with their environment, the part of the world in which life can exist including parts of the lithosphere, hydrosphere and atmosphere.

BIOTIC—Living.

BLIGHT—Type of plant disease.

BROADCAST APPLICATION—Application made nonselectively over a broad area.

BROAD-SPECTRUM PESTICIDE—Pesticide effective against a variety of pests.

C

CANOPY—The uppermost layer of a hardwood forest community; that is, the leaves and branches of the tallest trees.

CARBAMATES—A family of pesticides having similar chemical structures including Sevin and Furadan.

CARCINOGENIC—Cancer-causing—produces malignancy.

CARNIVORE—Animal that eats meat.

CHARACTERISTIC ABUNDANCE—Equilibrium level—the usual population of a given area.

CHECK AND BALANCE—Natural controls that cause characteristic abundance to remain at equilibrium unless tampered with.

CHLORINATED HYDROCARBONS—A family of pesticides with similar chemical structures including Chlordane and Lindane.

CHLOROPHYLL—Green matter essential for photosynthesis.

CHLOROSIS—Loss of green color (yellowing or whitening) in foliage.

CHRONIC POISONING—Poisoning as a result of small repeated doses of pesticide

CLIMAX COMMUNITY—A community that tends to remain stable over a long period of time.

COMMENSALISM—A relationship in which only one member of a pair benefits and the other "host" is neither benefited or harmed. (Examples: orchids, pineapple plants, shrimp/sponge, remora fish/shark.

COMMUNITY—Groups of interacting and interdependent populations of plants, animals and microrganisms which share a common environment and form a fairly complete trophic structure for the capture and release of energy and the cycling of material within the environment. Boundaries are hard to fix—some animals may move from one community to another—one or a few animals are usually dominant—plants are usually most common inhabitants.

COMPATIBILITY—Adaptability of two or more pesticides to be mixed and used without adverse effect on the target or pesticidal action of the components.

COMPETETION—All organisms rival each other for the conditions necessary for them to survive—can be between different species or between members of the same species—plant and animal causes population fluctuation.

CONSERVATION—The careful preserving or serving of natural resources.

CONSUMERS—Nearly every non-green living thing dependent on food-producing plants—directly or indirectly.

CONTAMINATION—To accidentally get a pesticide into other pesticides, seed, fertilizer, food or feed.

CORROSIVE POISON—Poison which can severly burn the mouth or stomach.

CULTURE—Learned behavior.

D

DAYS TO HARVEST—Interval required by law between last pesticide application and harvest.

DECOMPOSERS—Primitive plants without chlorophyll who use dead material to obtain food energy—chemically break down the wastes and dead bodies of plants and animals—extremely beneficial. (Examples: bacteria, molds, mushrooms)

DECOMPOSITION—Disintegration—separation of an entity into the elements which compose it.

DEFOLIANT—Spray that causes leaves to die and drop off.

DEGRADE—Break down or decompose.

DEPOSIT—Pesticide left on leaves, stems, fruit, other plant parts, or skin after pesticide application.

DERMOL—Relating to the skin.

DESSICANT—Chemical which draws moisture out of a plant causing it to wither and die.

DENSITY—Average number of individuals in a limited area.

DISRUPTION—Disturbance.

DIVERSIFY—To give variety to; variegate.

DOMESTICATION—Taming.

DORMANCY—Period of rest and inactivity.

DOWNWIND—The direction toward which the prevailing wind blows.

DRIFT—Movement by wind of fine particles of spray or dust to an area not intended to be treated.

E

ECOLOGY—Science of living things and their environment—the study of the relationships that exist in nature.

ECONOMIC THRESHOLD—Point at which a pest control action must be taken to avoid economic loss.

ECOSYSTEM—A community and its non-living support system with constant interaction between the living and non-living elements.

ELIXIR—A cure-all or panacea.

EMETIC—Something which causes vomiting and is used as a first aid for some kinds of poisoning.

ENERGY—Ability to produce power.

ENTOMOLOGIST—A scientist who studies insects.

ENTOMOPHOBIA—Irrational fear of insects.

ENVIRONMENT—Surroundings or conditions, including water, soil and air influencing the growth and well-being of organisms.

ENZYME—Protein substance essential to life.

EPA—Environmental Protection Agency, a branch of the federal government which is responsible for formation and enforcement of rules and regulations concerning pesticides.

ERADICATION—Complete and final extinction or extermination of a species throughout its range—extermination.

ETHIC—Standard for behavior.

EXTINCTION—Extermination—to kill the last of a kind.

F

FINITE—Limited amount.

FOOD CHAIN—A relationship of organisms successively feeding on each other.

FOOD WEB—Relationship of many organisms successively feeding on each other in complex patterns.

FOGGER—Aerosol generator for applying pesticide.

FOLIAGE—Leaves, stems and other aboveground plant parts.

FORMULATION—Mixture of one or more pesticides and other materials such as diluents and carriers as sold.

FUMIGATION—Pest control with chemicals that kill pests with a gas or vapor.

FUNGI—Small plant organisms that lack chlorophyll and which cause rots, mildews and other diseases. (singular: fungus)

FUNGICIDE—Pesticide used to kill or control fungi which cause plant diseases.

G

Granules—Pellets; a pesticide formulation of dry, ready-to-use, low-concentrate pesticide plus an inert carrier.

H

HERBICIDE—Poison for killing plants.

HERBIVORE—Animal that eats plants.

HETEROTROPH—Organism which must secure food from outside itself.

HOST—An organism on which another organism depends, either directly or indirectly.

HUMUS—Well-decomposed part of soil organic matter.

I

IPM—Integrated Pest Management—The use of all pest controls in a manner that causes minimum disruption of the environment: ecologically based pest population management which utilizes knowledge, monitoring, decision making criteria, materials and methods in concert with natural mortality factors.

ILLEGAL RESIDUE—Quantity of pesticide on the harvested crop which exceeds the legal limit.

INDUSTRIALIZATION—Process of change from a farming society to a manufacturing or commercial society.

INERT—Inactive.

INFESTATION—Number of pests in an area where they are not wanted.

MITE—Tiny animal with eight legs, often mistaken for or referred to as an insect.

MOLD—Fungus with conspicuous, profuse or woolly growth.

MONITORING—Close observation.

MORTALITY—Death rate.

MUTAGEN—Agent capable of modifying the genes, the material of heredity.

MUTATION—Major change in heredity.

MUTUALISM—Both organisms benefit. (Example: Yucca plant and yucca moth lichen = fungus + algae)

N

NATURAL ENEMY—Predators and parasites (insects, animals and diseases) that attack pests.

NEMATICIDE—Pesticide used to control nematodes.

NEMATODE—Tiny, tubular, unsegmented, eellike worms that feed on plant roots.

NEUTRALIZE—Counteract or destroy effectiveness of a chemical.

NITRIFICATION—Makes atmospheric nitrogen available to plants.

NONSELECTIVE PESTICIDE—Pesticide which controls a wide variety of pests, or which kills both desirable and undesirable organisms.

O

OPTION—Choice.

ORAL—Through the mouth.

ORGANIC—Living or once-living material composed largely of carbon.

ORGANISM—Any living thing: plants, animals, bacteria, insects and fungi.

ORGANOPHOSPHATE—A group of similar insecticides, including malathion, parathion and Diazinon.

OVICIDE—Insecticide used to kill insect eggs.

P

PARADOX—A statement that seems contradictory and yet is true.

PARASITE—Gets its food energy from another organism without killing it. (Example: tapeworms, lice, fungus)

PATHOGEN—An organism capable of causing disease.

PERENNIAL—A plant that normally lives more than two years.

PESTS—Organisms occupying space, eating food, and/or carrying out other biological functions in places where, for some reason, we don't want them.

PESTICIDE—Poison for killing organisms that man considers a pest.

PHOTOSYNTHESIS—Method by which green plants and some bacteria trap the sun's energy and store it in sugar molecules for use in survival and growth.

PHYTOTOXIC—Injurious to plants.

POPULATION—Number of individuals in an area.

POTENCY—Strength, such as the degree of toxicity of a chemical.

POTENTIAL—Possible.

POTENTIATION—To augment with a second substance with a resulting effect greater than predicted—synerzism.

PREDATOR—Animals or plants that kill others before or during the process of eating them.

PREVALENT—Most frequest—widely accepted.

PRIMARY PLANT FOODS—The three basic nutrients required for plant growth (nitrogen, phosphorus, potassium).

PRODUCER—One who generates.

PUPA—Stage of insect metamorphosis between larva and adult (plural: pupae)

PUTREFICATION—Decomposition of organic matter.

R

RE-ENTRY INTERVAL—Time span that must pass after application of a pesticide before it is safe to enter the treated area.

REPELLANT—Chemical which discourages insects or other pests from entering a treated area.

RESIDUE—Pesticide remaining on or in a plant or other treated area following a time lapse after the application.

RESISTANCE— 1. A characteristic that exists or is developed by natural selection that enables a pest population to survive normal application rates of pesticide.
2. Natural or developed characteristics of plants or animals which discourage attack by certain insects or disease organisms.

RODENTICIDE—Pesticide used to control rats, mice and other rodents.

RESURGENCE—Rising again to prominence.

ROTATION—Changing fields in which a certain crop is planted from year to year.

RUNOFF—Flow of surface liquid from land, plant or animal surfaces.

S

SANITATION—Procedures for cleanliness.

SCAVENGERS—Organisms that feed only on animals that have become very weak or have died. (Example: vultures)

SECONDARY PEST OUTBREAK—New key pest that develops when a pesticide is overused and kills the key pest and other organisms that were natural enemies of the second pest.

SECONDARY PLANT FOOD ELEMENTS—Calcium, magnesium and sulfur.

SIGNAL WORDS—Words on pesticide labels which indicate the toxicity of the pesticide: "Danger - Poison"; "Warning" or "Caution."

SILVICULTURE—Artificially planted forests and their nurture—forestry.

SOLUBLE—Dry powder that will easily dissolve in liquid.

SPECIES—A group of living organisms with similar characteristics.

SPORE—Reproductive cells of mushroom.

STERILITY—Incapablity to reproduce.

SUSCEPTIBLE—Organism that can be killed or injured by a pesticide.

STRESS—Strain or pressure.

SUCCESSION—Change in a community over a long period of time, usually from a simple community to a more complex one.

SUPPRESS—To hold down.

SWATH—Width of the area treated in one pass by a sprayer or other applicator.

SYNERGISM—An increase in toxicity of chemicals mixed together, beyond their total potency as separate agents.

SYNTHETIC—Material manufactured by man rather than being extracted from plants or animals.

SYSTEMIC—Insecticide that is absorbed into blood and makes whole plant or animal toxic to pests.

INFINITE—Unlimited amount.

INGEST—To eat or swallow.

INSECTICIDE—Poison which kills insects.

INSOLUBLE—Will not dissolve in water.

INTERVAL—A period of time—between pesticide application, or between application and harvest or reentry to the treated area.

INVERTEBRATE—Organism that has no backbone.

K

KEY PEST—Organisms which cause a significant reduction in resource yield every season unless some pest management action is taken.

L

LARVA—Immature or wormlike (grub) stage of an insect that does not resemble the adult form. (plural: larvae)

LARVACIDE—Insecticide used to kill insect larvae.

LD_{50}—Dose of a pesticide which kills half of a population of test animals if eaten or absorbed through the skin.

LETHAL—Toxic or deadly.

LIFE CYCLE—The various stages in the life of an organism.

LIMITING FACTOR—Condition which control the number of individuals of a species in a given area including shelter, temperature, water, space, food, enemies, disease and light.

LVC—Low-volume concentrate designed for ultra-low-volume applications.

M

MANIPULATION—Behavior designed to produce a planned change.

MAXIMUM DOSAGE—Largest amount of chemical that can safely be used without producing excessive residues or other ill effects.

METABOLISM—Sum of processes essential for life including production of energy, building of cells and disposal of wastes.

METAMORPHOSIS—Change in a life cycle.

MICROORGANISM—Extremely small organisms including algae, bacteria, fungi and germs.

T

TARGET—Area or plant intended to be treated with a pesticide.

TECHNOLOGY—Scientific knowledge.

TICK—A small, 8-legged, bloodsucking animal often called an insect by mistake.

TERRESTRIAL—Relating to the earth.

TILTH—Physical condition of the soil and its potential for cultivation of growing plants.

TOLERANCE—A term referring to the amount of pesticide that can remain in a plant or animal product to be eaten by humans or animals. Ability of a plant to develop even though attacked by disease or insect.

TOXIC—Poisonous.

TROPHIC—Feeding.

U

USDA—United States Department of Agriculture.

V

VECTOR—An agent capable of transmitting a pathogen from one organism to another.

VERMIN—Noxious animals or pests, usually rodents or insects.

VERTEBRATE—Organism having a backbone.

VOLATILITY—Tendency of a chemical to vaporize.

VULNERABLE—Sensitive to.

W

WEATHERING—Action of the wind, rain and dust to remove pesticides from the surfaces to which they were applied.

Z

ZERO TOLERANCE—A residue standard which does not allow any chemical residue to remain in or on a food product.

NAME _____

PERIOD _____

PROJECTS

25	1.	_____
10	2.	_____
5	3.	_____
10	4.	_____
1	5.	_____
5	6.	_____
5	7.	_____
5	8.	_____
5	9.	_____
5	10.	_____
5	11.	_____
5	12.	_____
10	13.	_____
10	14.	_____
10	15.	_____
10	16.	_____
5	17.	_____
5	18.	_____
5	19.	_____
20	20.	_____

TOTAL _____

QUIZES

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

QUIZ AVERAGE _____

PROJECT GRADE _____

MIDTERM EXAM _____

FINAL EXAM _____

COURSE GRADE _____